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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the DuPont Company. It also contains published reports of investigations at agricultural experiment stations and college institutions on subjects in the Company's products and other subjects of agricultural interest.

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X-RAYS PICK OUT SOIL MINERALS

A new piece of apparatus, which identifies minerals in soils within a matter of minutes by means of x-rays, has recently been purchased by the Soils Department of the Connecticut Agricultural Experiment Station. According to Dr. C. L. W. Swanson and Dr. Gerard A. Bourbeau, who will work with the instrument, it will speed up enormously the task of finding what kind of minerals and how much of each are contained in a particular soil.

Heretofore, identification of soil minerals has been a laborious process. Consequently, not as much work has been done on finding out the kinds and amounts of minerals in soils as would have been desirable. Information on soil minerals will make it possible to work out practical solutions to soil problems.

Called a Geiger counter x-ray spectrometer, the machine sends x-rays through samples of soil placed in it. Each mineral diffracts x-rays in an entirely different pattern from any other mineral. By means of a recorder attachment, these differing patterns become immediately apparent. The wavy lines by which they are pictured are actually drawn on paper by the recorder as the instrument operates. The instrument also contains a Geiger tube and counter which can measure the pulsations or strength of the diffracted rays for more exact information.

The Connecticut Station Soils Department is the second in the country to make use of the spectrometer for soils research. The machine is being put to immediate use for analyzing samples collected in the soil survey of the State, now in progress. Besides identifying and measuring quantities of minerals, it will be used in determining the structure of minerals that are of interest in soil fertility.

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LIFE ON A SOVIET COLLECTIVE FARM -- HOW WORK IS DISTRIBUTED -- WHAT COMPENSATION FARMERS GET -- TOLD IN NEW YORK TIMES STORY

One of the most revealing articles about farming conditions in the agricultural regions of Russia -- showing just how a collective farmer and his family live and work in Utopia -- has recently come to the attention of the editor of the Agricultural News Letter.

For years all of us have been hearing or reading all sorts of stories about the way in which the Soviet government put through its program of farm collectivization. We've been given conflicting reports about how it has operated over the years. Many of us have desired to get some simple information, giving succinctly the details about the peasant and his tasks and rewards so that we could really visualize what is going on over there on the other side of the world.

Fortunately for us, the New York Times Magazine has supplied this need. It has just printed, supplemented by several pictures, an illuminating article called "Life on a Soviet Collective." It is so clearly written, and contains so many factual details, that we obtained the permission of the Times to publish the details, so that any of our readers who do not see the Sunday Times could have the benefit of this story. The author is a United States government official who has come home after some time in Russia. He prefers to remain anonymous. This is understandable. Our government may some day want to send him back to Russia, or to some other country on the other Side of the Iron Curtain -- and if it were known he wrote this story, he might not be able to get the necessary visa. His usefulness to the government as an expert on Russia would consequently be greatly reduced.

Similarly, the author has not selected any particular collective farm of the 240,000 in Russia to describe. Instead, he has chosen to draw for us a composite picture -- so that the farm, and the people he describes, are roughly the average type. It is neither a model farm nor one of the worst.

Let us take a look at the composite farm collective first. It is called "Red October" in honor of the Red Revolution of October 1917. The area of the land is 2,700 acres. The sown acreage is 1,400 acres. But it takes about 200 households, with a total population of 700 to till it.

The composite farmer has been given the common Russian name of Ivan. Ivan is 40 years old, and a war veteran. He is head of a household of six, and lives in a two-room cottage. In this respect he is lucky, as most of the cottages in the village have only one room. His wife Maria is 36; his son Stepan

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is 14 and his son Mikhail is 12. He has a post-war baby, two-year old daughter named Galya. Maria's aged mother also lives with them. Everybody works except the grandmother and the youngest child. "Ivan, Maria and the baby sleep in the main room with the faded photographs of relatives long since gone and of brothers killed in the recent war," said the author of the New York Times story.

> "In one corner hang ikons -- religious paintings under which a candle is kept burning. The boys sleep in bunks in the kitchen near the stove. Grandma sleeps in a corner, also near the stove. Sometimes, in especially severe weather, the few chickens and two pigs are brought into the kitchen to keep them alive."

How does this home fit into the village? Here is the general appearance of "Red October":

> "Its physical appearance has not changed much in the past fifty years. A village clubhouse was built not long ago after the kolkhoz (collective farm) was formed. A small house was also built for the offices of the farm chairman, the agronomist, and the bookkeeper.
>
> "The village houses are of log construction with thatched roofs. Most of the houses are quite old and in need of repair and paint. Some have sagged considerably with age. There is little attempt to beautify either the homes or the village as a whole. Life is too strenuous and materials are too scarce. The main street, a dirt road, is about fifty feet wide and lined on both sides by houses. The road is deep rutted and extremely muddy in the spring and autumn."

As we have seen, there are 1,400 acres of cultivated land in the farm. The principle crops are winter rye, winter wheat, spring wheat, oats, barley, potatoes, vegetables, silage crops and cultivated grasses. To take care of this, some 300 persons over 16 years of age and about 100 children between 12 and 16 are employed -- a total of 400 people. The article explains why so many are employed:

> "In America and Western Europe the same area sown with comparable crops would, on the average, be cultivated by a small fraction of this number of people. But under the kolkhoz system there must be an administrative staff, bookkeepers, brigade leaders, squad leaders, storekeepers, watchmen for the granary, day and night guards for the vegetable fields to prevent thefts, and nursery employes."

In the farm under study, there are six brigades -- four for the field crops, and two for the vegetable crops. There are 35 to 40 persons in each brigade.

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"A field brigade is responsible for about 30 acres in winter wheat, 40 acres of winter rye, 6 acres of spring wheat, 2 acres of spring barley, 50 acres of oats, 90 acres of potatoes, 10 acres of fodder roots, and 2 acres of sugar beets. Each brigade leader controls the work of his brigade and records the work done by each of its members."

Ivan works in one of the field brigades. The two boys work all day when not in school, and Maria (the wife) also works in the vegetable brigade. She cannot stop working on the farm, much as she would like to do so, because if she did the income in cash and in kind to the family would decrease appreciably. So the baby is left in the farm nursery. Each morning Ivan and his family are told to what field they must go and what work they must do.

The farm workers have little mechanical equipment, only a limited number of horses, never enough animal manure, and no commercial fertilizers. Yields are low. The farmer has no adequate facilities and little or no time to work his small garden plot -- nor does his family.

The only mechanized equipment available is from the MTS or machine-tractor station, which provides five different collective farms with such services as plowing, tractor work, sowing, harrowing, threshing, etc. Before the war, the MTS did as much as 60% of the farm's operations, but the percentage has gone down considerably since tractors and horses were requisitioned by the Army.

The farm collective has certain fixed charges that it must pay, so the amount left over varies from year to year, depending on the weather and other factors that go into making a poor or a good crop. Each year the farm collective is told:

"how much produce to give to the Government, how much to give to the MTS for its services, how much to the seed fund, how much to sell to consumer cooperatives, how much to pay the Government on seed loans, and how much for the forage fund, the crop insurance fund, the fund to help invalids, and so forth. What is left over is divided among the collective farmers according to a complicated calculation of the amount and kind of work each farmer has performed during the year.

"The money income of the farm, resulting from the delivery of produce to the Government and from sales at bazaars, is spent on taxes and levies to the Government, for building up capital surplus for administrative and other expenses of the farm, for charitable 'donations' to other areas which suffered during the war or for other necessities. What is left over is divided among the farmers. The money returns from the kolkhoz have been meager."

What does Ivan get for his and his family's efforts? The article explains that Ivan cannot depend on stability and uniformity in payments in cash or in kind from year to year. He bears the brunt of wide fluctuations in harvests since "the Government is first claimant on the production."

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Ivan, his wife, and two boys received altogether for their year's labor: 1,500 rubles, 2,200 pounds of grain, 2,500 pounds of potatoes, 2,500 pounds of vegetables, and 2,000 pounds of hay and straw. All this is paid at the end of the year, although advances of money may be obtained during the year.

Since a man's shoes cost 288 rubles a pair, the article explains, the cash income of 1,500 rubles is just a little more than enough for four pairs of shoes, with practically nothing left in cash from the entire year's work. Of course, Ivan has some grain and potatoes, but whereas his family needs 2,300 pounds of grain, he gets only 2,200 pounds, a considerable part of which has to be fed to the livestock. Maria and the grandmother must then eat more potatoes and less grain. To get 95 pounds of low-grade meat for the entire family for a year, Ivan must sell 1,000 pounds of his small allotment of potatoes and vegetables to buy the meat.

Luckily, Ivan has a cow, two pigs, and a few chickens. He would like to own more livestock, but the limitations set by the Government, the difficulty of obtaining feed, and the money required to buy livestock make it impossible.

Ivan and his family live a simple life. Transportation is difficult because he is not allowed to own a horse. The Ministry of Agriculture has several hotel resorts for "agriculturists," but "the actual number of persons that these resorts can handle is only an infinitesimal fraction of the total number of farmers and other agriculturists in the U.S.S.R." Accomodations are likely to be governed by high prices and influence, the article explains.

"Red October" has no church, as the one that existed there before the Revolution was converted into a warehouse. The nearest church is six miles away, at the nearest big village. Maria sometimes goes to church there when she makes a trip to the village market. If Ivan or his family get sick, they must go to a small city twenty miles away over poor roads because the village has no doctor or nurse. And when he gets to the city, he finds the doctor does not have much equipment, and many people are waiting for treatment.

How does the Ivan of today compare with the Ivan of the pre-revolutionary days? Says the article:

> "Ivan's position today is probably better than that of the pre-revolutionary bednyak (very poor peasant) but far worse than that of the peasant of the old days who had the opportunity to get ahead by hard work and resourcefulness...Ivan is not a young man any more, and he has little chance of improving his and Maria's position. He knows that his future lot will be hard work and small return."

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DU PONT 60% SODIUM TCA WEED KILLER CONTROLS JOHNSON, BERMUDA, QUACK GRASSES IN CROPLANDS -- ALSO WEEDS AND GRASSES ON NON-CROP LANDS

Development of a new chemical that controls many noxious grasses which up to now have resisted the action of weed killers has been announced by the Du Pont Company.

The new compound is called Du Pont 60% Sodium TCA Weed Killer, or simply TCA -- so named because it is a salt of trichloroacetic acid. It is believed it will be of value to industries, railroads, government agencies, and ranchers, as well as to agriculturists.

TCA is effective against many important weed pests covering large areas of the United States, such as Johnson, Bermuda, and quack grasses, and prickly pear cactus. It has been offered for general distribution only after extensive laboratory and field tests showed its effectiveness against grasses. The facts that it is non-combustible, that its period of soil sterility is relatively short, and that it can be mixed with 2,4-D and other weed killers, are important advantages of TCA.

Du Pont scientists said that the new chemical promises to be especially helpful to farmers wishing to eradicate spots of noxious grasses from croplands, from ditchbanks and headlands, to railroads and government agencies for right-of-way clearance, to oil companies and other industrial concerns for weed control where precautions against fire are necessary, and in other applications, such as around buildings of various types and along fences.

It was also pointed out that with the introduction of TCA, growers in general have a choice of a weed killer best suited for their needs. 2,4-D, for example, is most effective on broad-leaved plants; "Ammate" Weed Killer (ammonium sulfamate) controls poison ivy and other woody perennial weeds; TCA controls many types of grasses which resist these two weed killers.

Tests with TCA were made in many localities, including the Agricultural Experiment Station of Kansas State College at Manhattan, Kansas. The grass killing properties of the trichloroacetate group had been discovered at the Pest Control Research Laboratories of the Grasselli Chemicals Department of the Du Pont Company. Subsequently, tests at Manhattan, Kansas, were undertaken by J. W. Zahnley, agronomist of the station, and G. L. McCall, a biologist of the Du Pont Company.

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The Kansas Station for a long time had been conducting weed control research, but, as Zahnley and McCall said, "up to the present time there has been no chemical which has satisfactorily controlled established stands of noxious perennial grasses without sterilizing the soil for a comparatively long period. Trichloroacetic acid and its derivatives seem to provide a solution to this problem."

Zahnley and McCall also said that TCA "offers one of the most practical means of control of noxious perennial grasses where they exist in small patches along roadsides, irrigation ditch banks, and in cultivated fields. No other chemical has shown so much promise for the practical eradication of prickly pear cactus from the pastures and ranges of the Southwest. Annual grasses can be controlled readily by relatively light applications to the foliage or by treating the soil just before the grass seed sprouts..... The soil sterility is severe but temporary. While TCA produces a condition in the soil that prevents plant growth for a short time, this condition disappears within 30 to 90 days, depending upon the amount of rainfall."

The Du Pont Company is suggesting the use of 200 lbs. per acre of the 60% sodium salt for control of Johnson grass, from 60 to 200 lbs. per acre for Bermuda and quack grass, and 25 lbs. per acre for the control of small seedlings or to suppress the growth of established grasses when complete kill is not desired. The Kansas State scientists report that prickly pear cactus has been eliminated by spraying with a solution containing the equivalent of about one pound of Du Pont 60% Sodium TCA Weed Killer per gallon of water.

Since the moisture content of the soil has an important bearing upon the effectiveness of soil applications of TCA and on the duration of soil sterility, it is recommended that local authorities be consulted before its use. TCA is not recommended for use in crop lands except as a spot treatment. It should not be used on or near valuable woody or herbaceous plants on or lawns or closely mowed turf.

NOTE: For additional information on Du Pont 60% Sodium TCA Weed Killer, please write to Editor, Du Pont "Agricultural News Letter," Wilmington 98, Delaware.

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MEASUREMENTS DYED PERMANENTLY INTO FISHING LINE

A new type of trolling line--with lengths permanently marked on it--has been developed.

Following exhaustive tests at Lake Pend Oreille, Idaho, the Weber Lifelike Fly Company of Stevens Point, Wisconsin, will market a 600-foot nylon monofilament trolling line which will be marked alternately every hundred feet with blue, yellow, and green dye.

The markings will save the angler the task of measuring his line or guessing how much he has out behind the boat while trolling. Nylon monofilament trolling lines are almost invisible in the water. They run freely through the rod guides and will not kink. Probably their outstanding advantage is the lessened water friction.

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LIVINGSTON STRESSES FREEDOM OF THOUGHT AS IMPORTANT FACTOR IN ACCOMPLISHMENTS OF RESEARCH WORKERS IN TALKS TO FARM GROUPS

Research is responsible for more improvement in living standards in the United States than any other one thing, according to Larry F. Livingston, Extension Division manager of the Du Pont Public Relations Department. Mr. Livingston has recently told numerous farm audiences, including the Farm and Home Week at the University of Illinois at Urbana, and the Association of Southern Agricultural Workers at Baton Rouge, La., that "in research I include investigations conducted both by industry and by such tax-supported organizations as the state and federal agricultural experiment stations."

Mr. Livingston gave his audiences a preview of chemical developments that are on the way from research laboratories, as well as intimate stories of the creation of such well-known things as rayon, nylon, plastics, polythene, "Lucite" acrylic resin, "Orlon" acrylic fiber, titanium metal, and numerous agricultural chemicals such as DDT and methoxychlor insecticides.

"There is freedom of thought in the research behind these things," he declared.

Impressed By Statement on Freedom of Thought Made by Kephart

The speaker said he was recently impressed with a statement made in this connection by L. W. Kephart, senior agronomist of the U. S. Department of Agriculture. Kephart, in explaining that many problems in the chemical control of weeds have not yet been solved, declared: "So long as there is no limit to man's

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imagination nor interference with his freedom to think, we may count on the answers being found. With the large number of excellent technical workers concentrating on this problem, it is inconceivable that some fine new practices will not come out."

Pointing out that 88% of Du Pont production never reaches the public as a Du Pont product, Mr. Livingston said: "Some companies, many of them small, can better produce individual items. Larger companies, for the most part, furnish the nation's basic materials. Today you farmers apply comparatively new chemical compounds that control plant diseases, kill flies and other destructive insects, destroy noxious weeds without harming the cash crop, help inhibit preharvest dropping of apples, and help grow bigger and better crops from disinfected planting seed on soil that is fortified with fertilizers containing nitrogen and other needed plant foods.

"Many of these new chemical farm-aids reach you as products of Du Pont or some other large chemical company, but equally as many are proprietary products of smaller firms which can exist only because they are able to obtain bulk technical-grade chemicals from some large manufacturer for mixing and processing into their own trade-marked products. If each manufacturer had to make his own basic material, the expense would be terrific."

Mr. Livingston said that because of improvements in seed-treating equipment and materials, most farmers prefer to have their planting seed treated by commercial treaters than do the job themselves with homemade equipment on the farm. He revealed that more than 7,000 commercial concerns such as grain elevators and producers of hybrid seed corn have expanded their established operations to include seed treatment.

One of Problems of Industry Is Low-Cost Production

The speaker said one of the ever-present problems in industry is how to make products available in large quantities at low cost.

He cited the history of cellophane as one example of how this problem was met. When cellophane made from agricultural raw materials came on the market it sold for $2.64 per pound and was not very satisfactory, he said. Continuing research developed less costly methods of manufacturing it and improving the product.

"As a result, there have been 20 price reductions," Mr. Livingston declared. "It now sells for approximately 45 cents a pound. Not only that, but the cellophane is better and there have been many new different types developed so that today there are more than 50 different kinds. Not only that but cellophane has been responsible, directly and indirectly, for the establishment of many new businesses, large and small."

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Industrial Development Requires Much Capital Investment

A new industrial development is expensive and requires the investment of large amounts of capital, he continued.

Mr. Livingston commented, by way of illustration, that before the first World War Germany had a virtual monopoly on dyes and during the war the United States could not get them.

"What happened was typically American," he said. "Before the war was over, 81 companies were doing research on dyes. This was an expensive proposition. Du Pont, alone, spent $43,000,000 in developing its dyestuffs industry during the next 18 years, before the earnings had offset the accumulated losses."

"The net result," he declared, "is that today we have a dye industry that stands second to none in quality and quantity."

The development of nylon illustrates the story of American industrial success "which means the cooperation between research, the investor, labor, and management," he said. He pointed out that it takes many years to develop a new material. Research started on nylon in 1928 and after seven years the large research team had been able to develop it only to the stage where it was a filament shot out of a hypodermic needle. Little was known about it, what it would do, whether it could be produced, or what it could be used for. It took three more years of research to get the answers to these and other problems.

"There was an expenditure of millions of dollars before nylon was developed to a point where it could be submitted for approval to the public which decides the worth of new things in our competitive system of economy," Mr. Livingston said. He added that nylon can now be made from a number of different ingredients including corncobs. Cobs and other farm-produced cellulosic materials are sources of a chemical known as furfural, which is turned into adiponitrile, a chemical important in making nylon. This farm-chemurgic development cost Du Pont about 12 years' time and approximately $1,000,000 spent on research.

Says Everybody Benefits From Results of Research

Showing his audience many of the new nylon products, he asked: "Who benefits from a development like this?" and declared: "The consumer must profit most or the whole project fails." Furthermore, the people who get new jobs from nylon benefit by it, the owners of the businesses weaving nylon yarn and, all the other products of nylon, profit and the communities where these businesses are located benefit. "Everybody benefits, everybody profits, and a higher standard of living results."

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CHEMICAL WEED KILLERS GIVE BEST RESULTS WHEN USED AS FOLLOW-UP TO GOOD CULTURAL PRACTICES BY FARMER

Chemicals were used extensively throughout the country last year to control weeds in farm crops, and even more interest in their use is being shown by farmers this year.

"An estimated million acres of corn and a half-million acres of oats and flax in Iowa alone were sprayed in 1948," according to Dr. E. P. Sylwester, of Iowa State College.

"Extensive use of chemicals to control weeds in flax and small grain resulted in the cleanest flax and small grain marketed on record," he says. He also credits weed control with helping produce the record-breaking yields of crops in 1948.

"When you knock out the plant-food and moisture robbers you get better results," he says. He emphasizes that control of weeds is being recommended "as a follow-up measure to good cultural practices." and explains that "use of good, clean seed; good rotations, including grasses; clean cultivation and good seedbed preparations; mowing to prevent weed-seed production; and use of smother crops will always form the foundation of any good weed-control program."

USE OF RIGHT AMOUNTS OF RIGHT KIND OF CHEMICALS, PROPERLY APPLIED, OFFERS BEST MEANS OF KEEPING WEEDS FROM TAKING CROP

Chemicals such as 2,4-D are the farmer's "ace-in-the-hole" in controlling weeds in crops, says Dr. E. P. Sylwester, extension botanist and plant pathologist, Iowa State College, Ames.

Dr. Sylwester points out that when unforeseen conditions develop such as an extremely wet season when cultivating equipment cannot be pulled through the field, chemical control is the only answer to how to keep weeds from taking a crop.

"Too, when perennials such as Canada thistle become concentrated in an area, chemicals can be used profitably even at the expense of injuring the crop to some extent," he adds.

The Iowa scientist says that chemicals offer the best means of controlling weeds in grass where there is no danger of injuring a crop.

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"Such areas as roadsides, ditchbanks, and pastures can be kept free of weeds by chemical sprays," he explains.

Pre-Emergence Spraying Still On Trial

Dr. Sylwester adds that pre-emergence spraying, where 2,4-D is applied to the soil before the corn crop appears above ground, is being recommended only on a trial basis again this year. He points out that more research is needed before this method of application can be recommended to farmers. He suggests that if a farmer wants to try it, he should apply 2,4-D as a pre-emergence spray to only a few rows of corn, keep accurate data on the conditions of the soil, rate of application, weather conditions, and results. This information can be used as a guide in next year's operations.

Dosage Recommendations For Spraying With 2,4-D

"Dosage recommendations for spraying with 2,4-D to kill weeds in crops are approximately the same in 1949 as this past year," he says. "The number of pounds per acre recommended should be strictly regarded as maximum dosages. More is known now than a year ago about the effect of 2,4-D as related to conditions such as the age of the weed, drouth, and frost. Too, more is known about the dangers of using 2,4-D in sensitive crops. An additional year of research has answered a lot of questions on the use of 2,4-D, but many are still unanswered."

Dr. Sylwester points out that research done this past year by A. L. Bakke and David Staniforth, botanists at Iowa State College, has shown that careful measurement and exact dosage are very important. He says that 2,4-D compounds have been improved so that they are more potent, better wetting agents are available, and better application equipment will be used.

"Trials conducted in corn, flax, and oats at Kanawha, Crystal Lake, and Ames show that spraying with 2,4-D gave good results in 1948 almost without exception when properly applied," Dr. Sylwester continues. "The tests also show that some injury to crops can be caused by overdosing. Where 2,4-D injured crops in 1948, it was usually not applied properly, or was applied in too heavy doses."

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MOTION PICTURES AVAILABLE ON LOAN

The Du Pont Company is glad to lend 16mm. sound prints of motion pictures to clubs and other organizations having a 16 mm. sound projector. The subjects covered range from a number of specific interest to the farmer to yarns and fabrics made of rayon and nylon. For full information, merely send a postal card to Agricultural News Letter, E. I. du Pont de Nemours & Company, Wilmington 98, Delaware.

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"FATHER OF FURFURAL INDUSTRY" AWARDED PERKIN MEDAL

Carl Shelley Miner, who was awarded the Perkin Medal on January 7, in recognition of his outstanding accomplishments in the field of industrial research, has been called the "father of the furfural industry," according to "Chemical and Engineering News," for January 17.

Miner, who founded the Miner Laboratories of Chicago, and his coworkers first found that this compound could be obtained by a commercially practicable process from oat hulls, the article says, adding:

"While he admits that this particular development was not the result of an effort to produce chemicals from farm by-products -- it was actually the result of astute observation of the results of research with an entirely different aim -- he is well-known for his interest and success in the utilization of agricultural materials through chemical processes.

"It was from the ideas of Carl Miner that the present important uses of furfural grew. Some 30 years ago, as he and his colleagues were carrying on research to improve the digestibility of oat hulls by treatment with acid, it was found that the hulls were made unpalatable to animals by the furfural produced. This sparked the original idea which grew to produce the most widely used solvent used for lubricating oil refining and for the purification of butadiene for wartime synthetic rubber, as well as a raw material for nylon."

Mr. Miner, in his medal address, "Science vs. Starvation," said that within a very short time one of the largest uses of furfural, which can now be made from corncobs, rice hulls, and other cellulosic materials as well as oat hulls, "will be in the production of nylon."

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PERKIN MEDAL WINNER CITES "TREMENDOUS POSSIBILITIES" IN HELPING ELIMINATE WORLD PROTEIN SHORTAGES BY FEEDING UREA TO RUMINANTS

Carl S. Miner, in his Perkin Medal Award speech, characterized "the contribution which micro-organisms can make to antistarvation as the most exciting phase of the whole subject" of "Science vs. Starvation," the theme of his address.

The speaker said that ammonia fed to the soil as fertilizer in various ways is now but one manner of maintaining food supply, and cited the fact that "science has shown that ammonia salts or urea can be fed to ruminants in amounts equivalent to one-third their protein."

"When we realize that one of the serious world shortages is of protein, that here is a potential substitute for one-third of the protein now fed to ruminants, and that in the last analysis it can be made from the constituents of air and water, the tremendous possibilities are apparent," he said.

"This use of ammonia and its derivatives as a substitute for part of the protein requirements of farm animals is no longer a laboratory experiment. Within recent months the Du Pont Company has begun to offer to the feed industry a urea product for use as a partial substitute for the ordinary plant proteins such as those of cottonseed meal, soybeans, and alfalfa, and that company's house organ reports in this connection that more than two million tons of urea-containing feeds have already been fed to farm animals.""

Chemical Research Increases World's Food Supply

Mr. Miner said "modern Malthusians and sociological pessimists" who have been prophesying starvation for the rapidly growing population have been overlooking the triumphs of chemistry and chemical research in increasing the world's food supply. He discussed new organic insecticides, fungicides, and other scientific means of reducing crop destruction. He recounted new knowledge in soil replenishment, fertilization, new plant strains such as hybrid corn, quick-freezing to preserve perishable crops, the ion-exchange technique in sugar production, and fat-preserving antioxidants. He added:

"We are hoping that the combined efforts of the synthesists in producing compounds tailored to destroy specific pests and the entomologists studying the life processes of the insects will eventually result in the almost complete elimination of this serious source of food loss."

Mr. Miner included new rodenticides, chemical weed killers, research to control the tendency of grains in storage to heat and cause their own destruction, and greater utilization of plant materials as direct substitutes for animal products as "important in economizing our foodstuffs."

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Accomplishments Cover Widely Diverse Subjects

Presentation of the Perkin Medal was made at a dinner in New York sponsored by the American Chemical Society, Society of Chemical Industry, the American Institute of Chemical Engineers, and the Electrochemical Society. Mr. Miner's accomplishments were related by Henry L. Cox, Corn Products Refining Company, who said Mr. Miner's name appears on numerous articles and patents which cover such widely diverse subjects as the manufacture of riboflavin, furfural, resins, feeds, glycerol products, fungicides, inks, and dehydrated vegetables.

Mr. Miner's name is now added to the list of distinguished Perkin Medal winners, including Dr. Elmer K. Bolton and Dr. C.M.A. Stine, director and former director of the Chemical Department of the Du Pont Company, Wilmington, Del., who received the medal in 1945 and 1940, respectively.

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*Mr. Miner's reference is to a statement on "Two-Sixty-Two" feed compound, Du Pont's commercial product which supplies urea for use in proprietary feeds, made by Dr. F. G. Keenen of the company's Ammonia Department before the Oklahoma Cottonseed Crushers' Association. This talk was reported in the "Agricultural News Letter," Vol. 15, No. 6, November-December, 1947. The exact quotation is: "The practical importance of the ability of the rumen micro-organisms to do this specialized job is indicated by the fact that about two million tons -- that's four billion pounds -- of commercial feeds, mostly for dairy cattle, had some urea in them in this country during the past three years." Dr. Keenen recently revised this estimate to bring it up to date, so that the figure now totals well over three million tons of commercial feeds that have contained urea.

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Agricultural News Letter (Du Pont)
Vol. 17, No. 3 May-June, 1949

THE VALUE OF ALKYL MERCURIALS TO AMERICAN AGRICULTURE *

By Dr. Royal J. Haskell, Senior Extension Plant Pathologist,
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Washington, D. C.

The development of the alkyl mercury compounds for treating crop seeds to free them and to protect them from disease-causing organisms has indeed been a great accomplishment. It would seem appropriate to note, first the importance of seed-borne diseases, next, some of the developments in seed treatment, and finally, how the discoveries of Dr. Morris S. Kharasch have contributed in the fight against plant diseases.

The estimated annual loss from plant diseases in the United States is between 1½ and 2 billion dollars. Of the 50,000 plant diseases, at least 500 are borne on the seed. For the most part they are caused by fungi, bacteria, or viruses. These organisms, in resting stages, are carried on, in, or with the seed and are so spread over long distances. It is in the fight against these culprits that the organic mercurials developed by Dr. Kharasch have been so useful.

New Era In Seed Treatment

In the 1930's his researches began to take effect. The development of the alkyl mercuries, especially ethyl mercury chloride and ethyl mercury phosphate, inaugurated a new era of seed treatment. At last dry chemicals were available that could be used in very small amounts, that were highly toxic to fungi and bacteria, and which at proper dosages could be applied safely to seeds. Treated seed could be stored safely. Furthermore, these fungicides were volatile, which means that a less thorough job of mixing could be permitted and also that disinfection of a zone of soil in the immediate vicinity of the treated seed became possible. This opened the way for an attack on soil-borne organisms responsible for seed decays, seedling blights, and damping off. It gradually became evident that, with many seeds, treatment for this one purpose alone, namely, seed and seedling protection, was of much benefit. Especially was this true with mechanically injured seed, or with seed of low viability, or with seed exposed to an unfavorable environment. The idea of seed treatment took hold, and organic mer-

* Abstract of paper presented before the Delaware Section of the American Chemical Society in Wilmington, Del., January 26, 1949, on the occasion of the John Scott Award to Dr. Morris S. Kharasch of the University of Chicago in recognition of his outstanding work in the field of alkyl mercurials.

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cury compounds proved to be excellent protectants as well as disinfectants. The seeds of most of our major crops may now be disinfected and protected with suitable chemicals to good advantage.

Some Results from Seed Treatment

An elevator company in one of the midwest grain states recently published a statement showing that through the use of an organic mercurial, increases in yield worth $332,000 were realized by the farmers of that community.

In 1947 the extension plant pathologist in Kansas estimated that seed treatment saved for farmers in his state and a hungry world 5 million bushels of wheat, 7-1/2 million bushels of oats, 5-3/4 million bushels of grain sorghum, and 370,000 bushels of barley. At prevailing farm prices this would have been worth nearly 28 million dollars.

In the case of cotton seed, increases in yield ranging from 10 percent to 15 percent are common and increases of 40 percent are not infrequent. For the United States as a whole, perhaps about 30 percent of seed cotton is treated, mostly with the organic mercurials. With a 1948 acreage of 23 million acres, this would mean 6,900,000 acres treated. If these treated acres yielded even 20 pounds more lint than the untreated, it would represent an increased production of 276,000 bales of lint and 111,504 tons of seed.

Everyone Benefits

The benefits from the alkyl mercurials include the increased income to the farmer because of higher yields of better quality; the added compensation for the man who does the treating; the benefit to the buyer from a larger volume of better quality products; increased business to the manufacturers of the chemicals and seed-treating machines, and finally the satisfaction that comes to the grower from producing a clean, high-quality crop.

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Agricultural News Letter (Du Pont)
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RESEARCH SHOWS WASHING DAIRY EQUIPMENT WITH SYNTHETIC DETERGENTS ALMOST COMPLETELY CHECKS BACTERIA DEVELOPMENT

Use of synthetic detergents for cleaning milking machines and other dairy equipment is now being recommended by many agricultural colleges because use of these so-called soapless soaps makes it possible almost completely to check development of bacteria.

The New Jersey Dairy Laboratories have made public the results of extensive experiments which show that neutral synthetic detergents drastically reduce the bacteria counts when used to clean milking and other equipment on the farm. They eliminate bothersome milkstone, which means practically no brushing is required.

SYNTHETIC-DETERGENT WASHING TESTS MADE ON HIGH-BACTERIA-COUNT FARMS

To find out just how much synthetic detergents reduce the bacteria counts when used to clean milking machines and other dairy equipment, research workers of the New Jersey Dairy Laboratories conducted their studies right out on a group of "troubled" farms. These scientists discovered that the synthetic detergents solved the bacteria-count problem on these farms. All had previously reported consistently high counts.

During the first weeks of the study, the cooperating farmers continued to clean their milking equipment as they had in the past. The Laboratory technicians made a careful study of these cleaning methods. They kept a careful record of the bacteria count on each farm, before and after the milk was pasteurized.

"In every case during this period the bacteria counts were dangerously -- unprofitably -- high," the research men report.

Then the same farmers were instructed to use only the neutral synthetic detergents to clean their milking equipment. Again a complete record of the bacteria count was kept on each farm.

"In every single case, before and after the milk was pasteurized, the bacteria count was only a fraction of what it had been before," they continued. "When the soapless suds were used regularly for cleaning the milking equipment, bacteria counts were slashed! The soapless suds alone had completely solved the bacteria-count problems on these farms."

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"FERMATE" FUNGICIDE FOR CONTROL OF FLOWER DISEASES, INCLUDING BLACK SPOT AND OTHER ROSE DISEASES, NOW AVAILABLE IN 8-OZ. PACKAGE

Large-scale tests of "Fermate" fungicide in rose gardens have established it as one of the chemicals least apt to injure the plants when used to control diseases.

This interesting new synthetic organic chemical has been found more generally effective for black spot and other rose diseases than most of the copper and sulfur fungicides. Of all these, it is the one least apt to cause injury to plant life.

The active ingredient in "Fermate" is ferric dimethyldithiocarbamate. Although "Fermate" has been generally available since 1947, it was originally prepared only in quantities suitable for larger users. This season it is being distributed in eight-ounce containers for use by home gardeners.

Among those who have pioneered in its testing and use are Professor L. M. Massey and Dr. A. W. Dimock of the Department of Plant Pathology at Cornell University. In an address on "Fermate" at the School for Growers and Foremen at Ithaca, Dr. Dimock said:

"Properly used, 'Fermate' is safer than earlier fungicides. It is more effective against a greater variety of fungi. It is safe to use with a wider variety of insecticides. The deposit is more resistant to weathering. It is less conspicuous on the foliage."

Professor Massey said that tests at Cornell and other places had shown that it can effectively control black spot and rust on roses, and diseases on chrysanthemums, carnations, geraniums, poinsettia, snapdragons, tulips, and the damping-off of seed rot of many flowers. It has not proved as effective in the case of powdery mildew, but gives good results on this disease when mixed with sulfur.

"Fermate" fungicide is a fluffy powder, of very small particle size, which may be used either as a spray or dust. To achieve the best results with it on roses and other flowers it is necessary to get it on both the top and bottom of the leaves. To insure complete wetting, it is desirable to mix the powder with a small amount of Du Pont Spreader-Sticker or one of the "soapless soaps" used in the kitchen and laundry. This also makes "Fermate" more "wettable". The resulting dispersion readily wets the foliage and sticks well.

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